

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
 United States Patent and Trademark
 Office
 Box PCT
 Washington, D.C.20231
 ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 06 September 2000 (06.09.00)	
International application No. PCT/EP99/06340	Applicant's or agent's file reference WO2924-DV/ME
International filing date (day/month/year) 30 August 1999 (30.08.99)	Priority date (day/month/year) 01 September 1998 (01.09.98)
Applicant WAJS, Andrew, Augustine	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
21 February 2000 (21.02.00)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Nestor Santesso Telephone No.: (41-22) 338.83.38
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PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

DE VRIES & METMAN B.V.
Overschiestraat 180
NL-1062 XK Amsterdam
PAYS-BAS

Date of mailing (day/month/year)

29 March 2000 (29.03.00)

Applicant's or agent's file reference

WO2924-DV/ME

International application No.

PCT/EP99/06340

IMPORTANT NOTIFICATION

International filing date (day/month/year)

30 August 1999 (30.08.99)

1. The following indications appeared on record concerning:

☐ the applicant☐ the inventor☒ the agent☐ the common representative

Name and Address

DE VRIES & METMAN B.V.
Gebouw Autumn
Overschiestraat 184 N
NL-1062 XK Amsterdam
Netherlands

State of Nationality

State of Residence

Telephone No.

+31 20 6694432

Facsimile No.

+31 20 6694516

Teleprinter No.

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☐ the person☐ the name☒ the address☐ the nationality☐ the residence

Name and Address

DE VRIES & METMAN B.V.
Overschiestraat 180
NL-1062 XK Amsterdam
Netherlands

State of Nationality

State of Residence

Telephone No.

020 511 0930

Facsimile No.

020 511 0931

Teleprinter No.

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

☒ the receiving Office☐ the International Searching Authority☐ the International Preliminary Examining Authority☒ the designated Offices concerned☐ the elected Offices concerned☐ other:The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

C. Cupello

Telephone No.: (41-22) 338.83.38

003195918

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference W02924-DV/ME	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/EP 99/ 06340	International filing date (day/month/year) 30/08/1999	(Earliest) Priority Date (day/month/year) 01/09/1998
Applicant MINDPORT B.V. et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

2

☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

T/EP 99/06340

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 985 921 A (SCHWARTZ HERMANN) 15 January 1991 (1991-01-15) abstract; claims; figures column 1, line 46 -column 2, line 3 ----	1,6,8
A	EP 0 552 079 A (GEMPLUS CARD INT) 21 July 1993 (1993-07-21) -----	

INTERNATIONAL SEARCH REPORT

International Application No

T/EP 99/06340

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 G07F7/10 G07C9/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 IPC 7 G07F G07C G11C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 95 34054 A (GIESECKE & DEVRIENT GMBH ; LAMLA MICHAEL (DE); RANKL WOLFGANG (DE);) 14 December 1995 (1995-12-14) abstract; claims; figures page 2, line 17 - page 3, line 3 page 17, line 36 - page 20, line 11 ---	1,6,8
A	EP 0 790 706 A (HEWLETT PACKARD CO) 20 August 1997 (1997-08-20) abstract; claims; figures ---	1,2,4, 6-8
A	US 5 533 123 A (NORCROSS THOMAS M ET AL) 2 July 1996 (1996-07-02) abstract; figures column 29, line 5 - line 47 ---	1,6,8
	--- -/--	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
 "E" earlier document but published on or after the international filing date
 "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
 "O" document referring to an oral disclosure, use, exhibition or other means
 "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
 "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
 "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
 "&" document member of the same patent family

Date of the actual completion of the international search

20 December 1999

Date of mailing of the international search report

12/01/2000

Name and mailing address of the ISA
 European Patent Office, P.B. 5818 Patentlaan 2
 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
 Fax: (+31-70) 340-3016

Authorized officer

Meyl, D

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 99/06340

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9534054	A	14-12-1995	DE 4419805 A	07-12-1995
			AT 185010 T	15-10-1999
			AU 701313 B	28-01-1999
			AU 2787295 A	04-01-1996
			CA 2168891 A	14-12-1995
			CN 1131991 A	25-09-1996
			DE 19580597 D	01-04-1999
			DE 59506884 D	28-10-1999
			EP 0712520 A	22-05-1996
			JP 9501529 T	10-02-1997
			US 5850524 A	15-12-1998

EP 0790706	A	20-08-1997	US 5737766 A	07-04-1998
			JP 9232433 A	05-09-1997

US 5533123	A	02-07-1996	EP 0715733 A	12-06-1996
			WO 9600953 A	11-01-1996

US 4985921	A	15-01-1991	AT 123347 T	15-06-1995
			DE 58909263 D	06-07-1995
			EP 0337185 A	18-10-1989
			ES 2072870 T	01-08-1995

EP 0552079	A	21-07-1993	FR 2686170 A	16-07-1993
			JP 5314013 A	26-11-1993
			SG 52681 A	28-09-1998
			US 5875480 A	23-02-1999

INTERNATIONAL RECHERCHENBERICHT

atic : Aktenzeichen
PCT/EP 95/02104

A. KLASSIFIZIERUNG DES ANMELDUNGSGEGENSTANDES
IPK 6 G07F7/10

Nach der Internationalen Patentklassifikation (IPK) oder nach der nationalen Klassifikation und der IPK

B. RECHERCHIERTE GEBIETE

Recherchierter Mindestprüfstoff (Klassifikationssystem und Klassifikationssymbole)
IPK 6 G07F G06K

Recherchierte aber nicht zum Mindestprüfstoff gehörende Veröffentlichungen, soweit diese unter die recherchierten Gebiete fallen

Während der internationalen Recherche konsultierte elektronische Datenbank (Name der Datenbank und evtl. verwendete Suchbegriffe)

C. ALS WESENTLICH ANGESEHENE UNTERLAGEN

Kategorie*	Bezeichnung der Veröffentlichung, soweit erforderlich unter Angabe der in Betracht kommenden Teile	Betr. Anspruch Nr.
A	DE,A,42 30 866 (VENTURE ENGINEERING MANAGEMENTGESELLSCHAFT) 17. März 1994 siehe das ganze Dokument ---	1,4-7, 13,16, 17,22
A	FR,A,2 471 003 (ÉLECTRONIQUE MARCEL DASSAULT) 12. Juni 1981 siehe Seite 4, Zeile 5 - Seite 5, Zeile 25 siehe Seite 7, Zeile 17 - Zeile 35; Ansprüche; Abbildung 1 ---	1-5, 12-14, 16,17, 20,23-25
A	EP,A,0 256 768 (OKI ELECTRIC INDUSTRY) 24. Februar 1988 siehe Zusammenfassung; Abbildungen 1,4A siehe Spalte 4, Zeile 6 - Zeile 38 --- -/--	1-3,12, 16,20

☒ Weitere Veröffentlichungen sind der Fortsetzung von Feld C zu entnehmen

☒ Siehe Anhang Patentfamilie

* Besondere Kategorien von angegebenen Veröffentlichungen :

"A" Veröffentlichung, die den allgemeinen Stand der Technik definiert, aber nicht als besonders bedeutsam anzusehen ist

"E" älteres Dokument, das jedoch erst am oder nach dem internationalen Anmeldedatum veröffentlicht worden ist

"L" Veröffentlichung, die geeignet ist, einen Prioritätsanspruch zweifelhaft erscheinen zu lassen, oder durch die das Veröffentlichungsdatum einer anderen im Recherchenbericht genannten Veröffentlichung belegt werden soll oder die aus einem anderen besonderen Grund angegeben ist (wie ausgeführt)

"O" Veröffentlichung, die sich auf eine mündliche Offenbarung, eine Benutzung, eine Ausstellung oder andere Maßnahmen bezieht

"P" Veröffentlichung, die vor dem internationalen Anmeldedatum, aber nach dem beanspruchten Prioritätsdatum veröffentlicht worden ist

"T" Spätere Veröffentlichung, die nach dem internationalen Anmeldedatum oder dem Prioritätsdatum veröffentlicht worden ist und mit der Anmeldung nicht kollidiert, sondern nur zum Verständnis des der Erfindung zugrundeliegenden Prinzips oder der ihr zugrundeliegenden Theorie angegeben ist

"X" Veröffentlichung von besonderer Bedeutung, die beanspruchte Erfindung kann allein aufgrund dieser Veröffentlichung nicht als neu oder auf erfinderischer Tätigkeit beruhend betrachtet werden

"Y" Veröffentlichung von besonderer Bedeutung, die beanspruchte Erfindung kann nicht als auf erfinderischer Tätigkeit beruhend betrachtet werden, wenn die Veröffentlichung mit einer oder mehreren anderen Veröffentlichungen dieser Kategorie in Verbindung gebracht wird und diese Verbindung für einen Fachmann naheliegend ist

"&" Veröffentlichung, die Mitglied derselben Patentfamilie ist

Datum des Abschlusses der internationalen Recherche

19. Oktober 1995

Absendedatum des internationalen Recherchenberichts

02.11.95

Name und Postanschrift der Internationale Recherchenbehörde
Europäisches Patentamt, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax (+31-70) 340-3016

Bevollmächtigter Bediensteter

David, J

C.(Fortsetzung) ALS WESENTLICH ANGESEHENE UNTERLAGEN

Kategorie*	Bezeichnung der Veröffentlichung, soweit erforderlich unter Angabe der in Betracht kommenden Teile	Betr. Anspruch Nr.
A	EP,A,0 409 701 (ÉTAT FRANCAIS) 23. Januar 1991 ---	
A	US,A,5 034 596 (Y. UTSUNOMIYA) 23. Juli 1991 ---	
A	EP,A,0 337 185 (SPA SYSPATRONIC) 18. Oktober 1989 -----	



REC'D 04 JAN 2001

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference WO2924-DV/jdh		FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/EP99/06340	International filing date (day/month/year) 30/08/1999	Priority date (day/month/year) 01/09/1998	
International Patent Classification (IPC) or national classification and IPC G07F7/10			
Applicant MINDPORT B.V. et al.			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 7 sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input type="checkbox"/> Certain defects in the international application VIII <input checked="" type="checkbox"/> Certain observations on the international application 			
Date of submission of the demand 21/02/2000		Date of completion of this report 28. 12. 00	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized officer Stratford, C Telephone No. +49 89 2399 2268 	

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP99/06340

I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).):*

Description, pages:

2-4	as originally filed	
1,5-7	with telefax of	11/12/2000

Claims, No.:

1-10	with telefax of	11/12/2000
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Drawings, sheets:

1/2	as originally filed	
2/2	with telefax of	11/12/2000

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP99/06340

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-10
	No:	Claims	
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-10
Industrial applicability (IA)	Yes:	Claims	1-10
	No:	Claims	

2. Citations and explanations
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

5.0 With reference to Section V

5.1 Reference is made to the following documents:-

- D1: WO 95 34054 A (GIESECKE & DEVRIENT GMBH; LAMLA MICHAEL (DE); RANKL WOLFGANG (DE);) 14 December 1995 (1995-12-14)
- D2: EP-A-0 790 706 (HEWLETT PACKARD CO) 20 August 1997 (1997-08-20)
- D3: US-A-5 533 123 (NORCROSS THOMAS M ET AL) 2 July 1996 (1996-07-02)

This numbering will be adhered to throughout the application process.

5.2 Independent claims 1, 6, and 8 fail to meet the requirements of Article 33(3) PCT because they lack an inventive step.

The document D1 (in the description corresponding to Figure 9) is regarded as being the closest prior art to the subject-matter of claim 1, and discloses a secure device ('Datenträger') comprising a chip with logic circuitry, wherein the chip is provided with a unique chip layout (the hard coded serial number - see pages 17-18, bridging paragraph). The serial number in D1 is used to identify the secure device; it is clear to the skilled person that this could equally well be a class or group of devices.

The secure device of D1, which is preferably a chip card, is clearly intended for uses common to chip cards, i.e. including preventing unauthorised access. The skilled person would not require any inventiveness to implement the chip card in such a security system. Claims 6 and 8, which do not have any features not already stated in claim 1, are similarly not inventive.

5.3 The dependent claims 2-5, 7, 9, and 10 are also lacking in an inventive step. These claims relate to small changes and constructional details which the skilled person would choose to use according to the specific circumstances and requirements. The various uses of FPGAs are generally known in the state of the art, and their flexibility is clearly advantageous for such a use (see e.g. D2). Secure cells for physically protecting sensitive areas are similarly known (see e.g.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP99/06340

D3). Introducing the variation to the circuit at a design stage (e.g. at synthesis or layout) are obvious possibilities.

8.0 With reference to Section VIII

8.1 The term '...or the like' used in claim 1 is not clear, because the scope of the claim is not well defined (Article 6 PCT).

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WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁷ : G07F 7/10, G07C 9/00</p>	<p>A1</p>	<p>(11) International Publication Number: WO 00/13151</p> <p>(43) International Publication Date: 9 March 2000 (09.03.00)</p>		
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top; padding: 5px;"> <p>(21) International Application Number: PCT/EP99/06340</p> <p>(22) International Filing Date: 30 August 1999 (30.08.99)</p> <p>(30) Priority Data: 98202915.9 1 September 1998 (01.09.98) EP</p> <p>(71) Applicant (for all designated States except US): IRDETO ACCESS B.V. [NL/NL]; Jupiterstraat 42, NL-2132 HD Hoofddorp (NL).</p> <p>(72) Inventor; and (75) Inventor/Applicant (for US only): WAJS, Andrew, Augustine [GB/NL]; Schotersingel 93, NL-2023 AA Haarlem (NL).</p> <p>(74) Agent: DE VRIES & METMAN B.V.; Gebouw Autumn, Overschiestraat 184 N, NL-1062 XK Amsterdam (NL).</p> </td> <td style="width: 50%; vertical-align: top; padding: 5px;"> <p>(81) Designated States: CN, JP, US.</p> <p>Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p> </td> </tr> </table>			<p>(21) International Application Number: PCT/EP99/06340</p> <p>(22) International Filing Date: 30 August 1999 (30.08.99)</p> <p>(30) Priority Data: 98202915.9 1 September 1998 (01.09.98) EP</p> <p>(71) Applicant (for all designated States except US): IRDETO ACCESS B.V. [NL/NL]; Jupiterstraat 42, NL-2132 HD Hoofddorp (NL).</p> <p>(72) Inventor; and (75) Inventor/Applicant (for US only): WAJS, Andrew, Augustine [GB/NL]; Schotersingel 93, NL-2023 AA Haarlem (NL).</p> <p>(74) Agent: DE VRIES & METMAN B.V.; Gebouw Autumn, Overschiestraat 184 N, NL-1062 XK Amsterdam (NL).</p>	<p>(81) Designated States: CN, JP, US.</p> <p>Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>
<p>(21) International Application Number: PCT/EP99/06340</p> <p>(22) International Filing Date: 30 August 1999 (30.08.99)</p> <p>(30) Priority Data: 98202915.9 1 September 1998 (01.09.98) EP</p> <p>(71) Applicant (for all designated States except US): IRDETO ACCESS B.V. [NL/NL]; Jupiterstraat 42, NL-2132 HD Hoofddorp (NL).</p> <p>(72) Inventor; and (75) Inventor/Applicant (for US only): WAJS, Andrew, Augustine [GB/NL]; Schotersingel 93, NL-2023 AA Haarlem (NL).</p> <p>(74) Agent: DE VRIES & METMAN B.V.; Gebouw Autumn, Overschiestraat 184 N, NL-1062 XK Amsterdam (NL).</p>	<p>(81) Designated States: CN, JP, US.</p> <p>Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>			
<p>(54) Title: SECURITY SYSTEM</p> <div style="text-align: center; margin: 20px 0;"> <pre> graph TD 12[CPU] --- 13[EEPROM] 16[Random Bus & Logic] --- 14[RAM] 15[Secure Cell] </pre> </div>				
<p>(57) Abstract</p> <p>A security system for preventing unauthorized use, entrance or the like, comprises a number of secure devices, each of the secure devices comprising a chip with logic circuitry having a function in providing authorization to the security system. In at least a part of the secure devices the chip of a secure device is provided with a unique chip layout.</p>				

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
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CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon		Republic of Korea	PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

Security system

The present invention relates to a security system for preventing unauthorized use, entrance or the like, comprising a number of secure devices, each of said secure devices comprising a chip with logic circuitry having a function in providing authorization to the security system.

Security systems of the above-mentioned type are used in many applications, such as for example to prevent unauthorized access to secured rooms, in pay tv applications, in banking systems etc. The security devices used are generally made as so-called smart cards comprising a chip. It will be clear that in view of the many smart cards provided to many different persons, security systems of this type are open to attack by pirates or defrauders. Attacking a smart card currently involves a process, wherein during an analysis phase the chip of the smart card is probed to find a means of attack. In this process of attacking the layout of the chip is analysed to identify the appropriate probe points to access the data contained in the chip. Thereafter the attack is planned in a preparation phase and finally the contents of the chip are extracted in the actual attack phase. While the first and second steps typically take months, the third step can be performed in under a day. This means that once a smart card has been cracked for the first time, any second attack is relatively easy. It will be clear that this is a serious problem in security systems. For, once a smart card has been identified as being broken and has been disabled by the controlling system, the pirate can crack another card in a repeated attack within a relatively short period and thereby continue with piracy or fraud.

Moreover, the smart cards used in prior art security systems are generally provided with a chip with the same basic silicon layout, even when used in different applications. If for example a smart card of a specific type is

hacked for its banking information, the knowledge obtained by hacking this banking card can also be used to extract the secure information from the same type of card when it is used in a different application, for example in a pay television system.

The invention aims to provide a security system of the above-mentioned type wherein the vulnerability for an attack by a pirate is significantly decreased and wherein the time required for a repeated attack of the secure device is substantially increased.

To this end the invention provides a security system of the above-mentioned type, characterized in that in at least a part of said secure devices, the chip of a secure device is provided with a unique chip layout.

In this manner a security system is obtained wherein at least a part but preferably all secure devices are provided with a chip with a random layout of the logic circuitry of the secure device. This means that the hardware implementation of the secure functionality of the secure device varies from device to device.

According to a preferred embodiment at least said logic circuitry of the chips of said part of the secure devices is implemented in FPGA technology, wherein the layout is programmed in the FPGA circuitry either in a volatile or non-volatile manner.

The invention further provides a set of secure devices to be used in a security system of the invention, wherein each of said secure devices comprises a chip with logic circuitry having a function in providing authorization to the holder of a secure device, wherein in at least a part of said secure devices, the chip of each secure device is provided with a unique chip layout.

Finally, the invention provides a method for manufacturing a secure device for the the security system of the invention, wherein secure devices with a chip are used, said chips having logic circuitry having a function in providing authorization to the security system, wherein in

at least a part of said secure devices the chip of a secure device is provided with a unique chip layout.

The invention will be further explained by reference to the drawings, in which an embodiment of the system and method of the invention are schematically shown.

Fig. 1 schematically shows a pay tv system comprising an embodiment of a security system of the invention.

Fig. 2 schematically shows the internal structure of a smart card used as secure device in the system of fig.

10 1.

Fig. 3 shows a diagram of an embodiment of the method of the invention.

Fig. 1 shows merely by way of example a broadcasting system wherein three broadcasters 1-3 are coupled with a multiplexer unit 4. The multiplexer unit 4 comprises means for scrambling, encoding and compressing broadcast signals provided by the broadcasters 1-3 and the thus obtained digital data streams are multiplexed into a digital transport stream. In the embodiment shown this digital transport stream is modulated by way of modulator 5 before transmission. The operator of the equipment including the multiplexer unit 4 and modulator 5 is responsible for transmitting the signal to the receiving equipment of the public, one television set 6 being shown by way of example in fig. 1. One or more of the broadcasters 1-3 may be private broadcasters operating according to the concept of pay tv which implies subscription. This means that people wishing to view programs broadcasted by a particular broadcaster, have to subscribe to such a broadcast and pay the appropriate fee.

30 As schematically indicated the transmission of the signal may be carried out through one or more telecommunication channels including a satellite link 7, terrestrial link 8 or a cable system 9.

Access to anyone of the broadcast signals provided by the broadcasters 1-3 requires a decoder 10 generally including a conditional access module not shown cooperating with a smart card 11 in a manner known per se. The smart

card 11 is one of the secure devices of a security system implemented in the broadcasting system shown in fig. 1 to prevent unauthorized access to pay tv signals by persons which did not subscribe to the broadcast. Each subscriber is provided with a smart card 11, each smart card 11 having a unique key and/or address. This security system may operate for example in a manner known per se using ECM's and EMM's to provide access to the pay tv signals to authorized persons having a smart card 11 with means for providing authorization to the security system.

As explained above, such a security system is open to attack by pirates trying to copy an original smart card to thereby provide a large number of pirate smart cards. In order to substantially increase the time required for a repeated attack on a smart card, the security system described is provided with secure devices or smart cards 11, each of the smart cards comprising a chip with logic circuitry having a function in providing authorization to the system in a conventional manner. The logic circuitry may include the circuitry to store a unique key, and/or the algorithms and logic required to provide authorization, for example the algorithm to decrypt the key hierarchy used in a security system such as eurocrypt.

Fig. 2 shows in a very schematic manner the internal structure of a smart card 11 showing that the chip of the smart card 11 includes a central processing unit 12, an EEPROM circuit 13, a RAM circuit 14 a secure cell 15 and random bus and logic circuitry 16. In the embodiment described the unique circuit layout is provided only in the secure cell 15, in which for example a cryptographic engine and a volatile storage element for storing a secret key are located. For a further explanation of this structure of a smart card reference is made to European Patent Application 97202854.2 of the same applicant.

According to a preferred embodiment the secure cell is implemented in FPGA technology (field programmable gate array). The FPGA circuit of the secure cell 15 is program-

med in a usual manner in accordance with the diagram of fig. 3 to personalize the smart card. In order to personalize a smart card 11, unique information is stored in the secure cell, this unique information comprising a unique key, a key decryption algorithm used in the security system or the like. Usually an FPGA is programmed as follows. First the unique information for personalization is written in a high level language, for example C or VHDL. The high level language is first compiled. Thereafter the information is put through a synthesis tool which generates a logic implementation of the high level language code. This logic implementation would generally include logic circuitry such as AND gates, OR gates, D latches etc., which are combined to produce the correct cryptographic functionality. Thereafter the logic implementation is put through a routing program which constructs the actual program file for a particular FPGA. This file will specify which cells are interconnected within the FPGA and how each cell is programmed. The actual program file is then loaded into the FPGA circuit on power up or fuse blown into the FPGA depending on the particular FPGA technology used.

Generally a synthesis tool can produce many variations of the same functionality. In prior art applications the synthesis tool is designed to produce logic which utilizes the minimum number of gates, shows an optimal power efficiency, has the best speed performance or a compromise of the above.

According to the present invention a variation factor, for example a random number, is introduced into the synthesis tool such that the layout provided by the synthesis tool will vary from chip to chip. As schematically shown in the diagram of fig. 3, a variation factor, such as a random number is fed into the synthesis tool and this results in the tool generating a set of logic which is unique to that variation factor. A new variation factor is used for personalizing each of the smart cards 11 of the security system. In this manner it is obtained that each

smart card 11 of the security system has a unique layout of the logic circuitry of the secure cell 15.

Similarly a variation factor can be fed into the layout tool resulting in a further randomizing of the layout
5 of the logic circuitry.

Further it is possible to introduce a variation factor in the compilation step, so that the input to the synthesis tool will receive a varying input. All possible variations can be used either separately or in combination.

10 Using the method of the invention the personalization step introducing a unique key, the logic implementation of the key and/or the decryption functions into the smart card 11, will result in a layout of the logic circuitry which is unique to each smart card 11. In this manner it is
15 obtained that the time needed for each attack of a security system is substantially increased as the pirate can not use the information obtained in an analysis phase and a preparation phase in an attack of a first smart card, in attacking another smart card.

20 As an alternative, instead of using FPGA technology in the secure cell only, more parts of the chip or the entire chip of the smart card can be built using FPGA techniques and can then be randomized in the above described manner.

25 In a preferred embodiment a volatile FPGA is used, wherein the FPGA program is stored in RAM 14 of the smart card 11, which is powered by a battery just as the volatile storage of the key in the secure cell 15. Including defense traps as known per se in the smart card chip will result in
30 a loss of the contents of the RAM memory and the volatile storage of the secure cell 15 if a pirate fails to overcome the defense strategy of the chip. Thereby the programming of the FPGA circuitry will be lost. In this manner it is obtained that by attacking a card no information is gathered
35 on how to attack a next card.

Although the invention is explained in the above by reference to a pay tv system, the security system of the

invention can be used in any security system using secure devices for providing authority to the holder of the secure device, such as security systems used to protect rooms, buildings, or the like against unauthorized entrance, banking cards etc. Further, although it is preferred to provide each smart card with a unique layout it is also possible to provide groups of cards with a unique layout.

The invention is therefore not restricted to the above described embodiment which can be varied in a number of ways within the scope of the claims.

CLAIMS

1. Security system for preventing unauthorized use, entrance or the like, comprising a number of secure devices, each of said secure devices comprising a chip with logic circuitry having a function in providing authorization to the security system, characterized in that in at least a part of said secure devices, the chip of a secure device is provided with a unique chip layout.

2. Security system according to claim 1, wherein at least said logic circuitry of the chips of said part of the secure devices is implemented in FPGA technology, wherein the layout is programmed in the FPGA circuitry either in a volatile or non-volatile manner.

3. Security system according to claim 2, wherein the logic circuitry of each secure device chip is provided in a secure cell of the chip.

4. Security system according to claim 1, wherein the complete secure device chip is implemented in FPGA technology, wherein the layout is programmed in the chip either in a volatile or non-volatile manner.

5. Security system according to claim 2, 3 or 4, wherein the logic circuitry or the entire chip is made as a volatile programmable FPGA, wherein the FPGA program is stored in a battery powered RAM.

6. A set of secure devices to be used in a security system according to anyone of claims 1-5, wherein each of said secure devices comprises a chip with logic circuitry having a function in providing authorization to the holder of a secure device, wherein in at least a part of said secure devices, the chip of each secure device is provided with a unique chip layout.

7. A set according to claim 6, wherein at least said logic circuitry of the chips of said part of the secure devices is implemented in FPGA technology, wherein the layout is programmed in the FPGA circuitry either in a

volatile or non-volatile manner.

8. Method for manufacturing a secure device for a security system according to anyone of claims 1-5 or for a set of secure devices according to claim 6 or 7, wherein
5 secure devices with a chip are used, said chips having logic circuitry having a function in providing authorization to the security system, wherein in at least a part of said secure devices, the chip of a secure device is provided with a unique chip layout.

10 9. Method according to claim 8, wherein chips with logic circuitry in FPGA technology are use, said method comprising the steps of programming a unique information in the logic circuitry by means of synthesis tool and a layout tool, wherein for each secure device of said part of secure
15 devices, a variation factor is introduced in at least one of the synthesis tool and the layout tool, thereby providing a unique circuit layout.

10 10. Method according to claim 9, wherein the synthesis tool is provided with input information compiled
20 from a high level language code, wherein a variation factor is introduced in at least one of the compilation step of the high level language code, the synthesis tool and the layout tool.

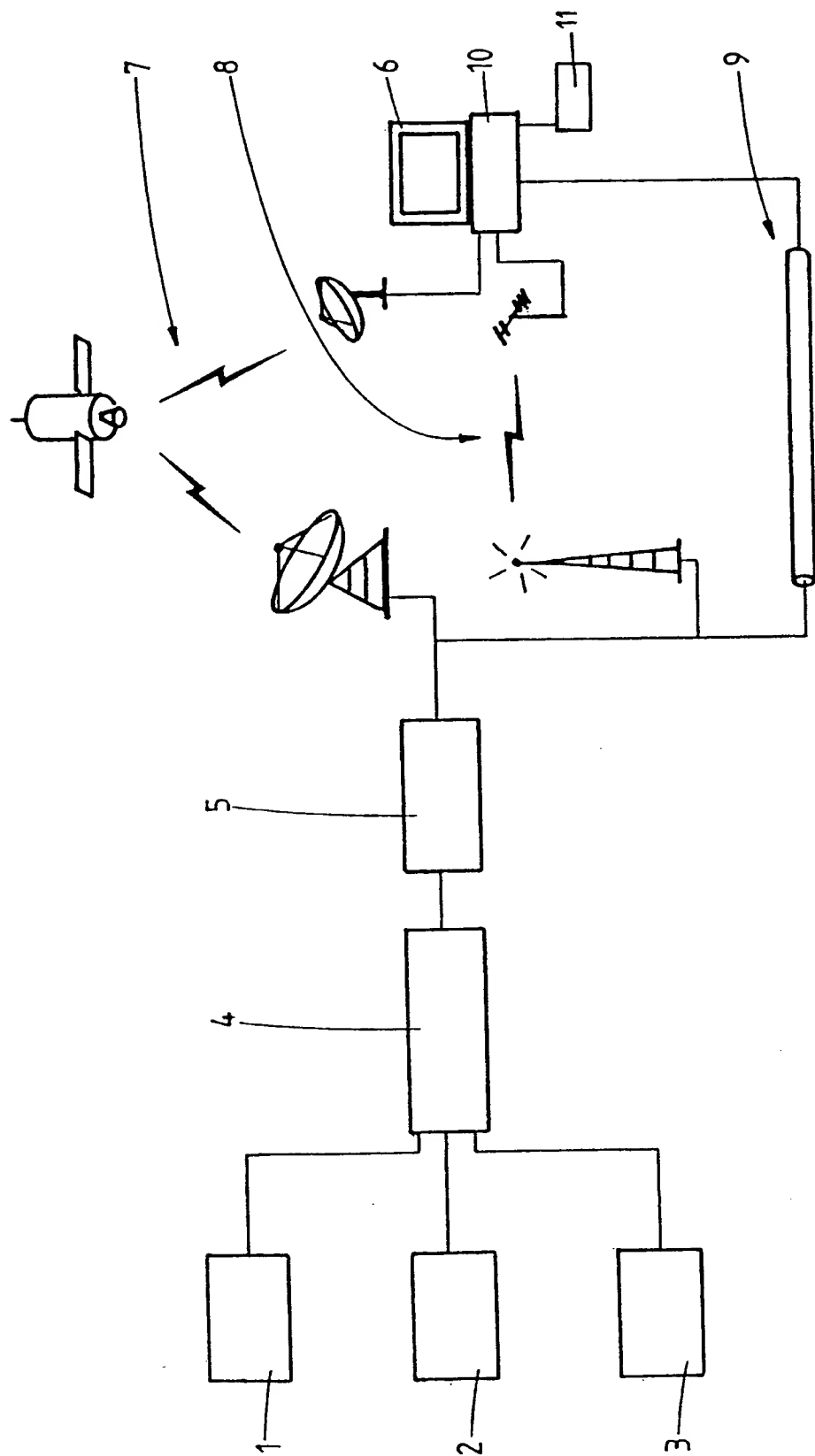


fig.1

fig. 2

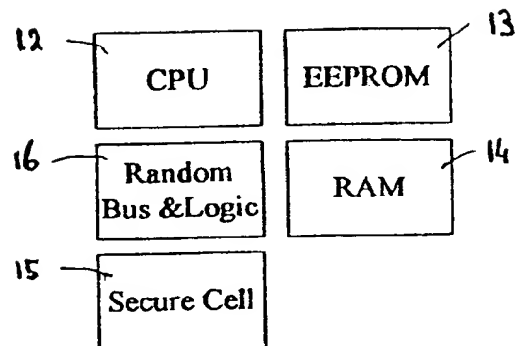
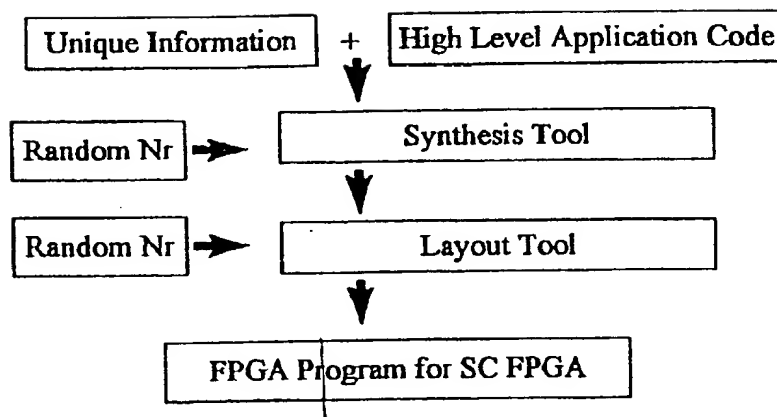


fig. 3



INTERNATIONAL SEARCH REPORT

onal Application No

PCT/EP 99/06340

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G07F7/10 G07C9/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G07F G07C G11C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 95 34054 A (GIESECKE & DEVRIENT GMBH ;LAMLA MICHAEL (DE); RANKL WOLFGANG (DE);) 14 December 1995 (1995-12-14) abstract; claims; figures page 2, line 17 -page 3, line 3 page 17, line 36 -page 20, line 11 ---	1,6,8
A	EP 0 790 706 A (HEWLETT PACKARD CO) 20 August 1997 (1997-08-20) abstract; claims; figures ---	1,2,4, 6-8
A	US 5 533 123 A (NORCROSS THOMAS M ET AL) 2 July 1996 (1996-07-02) abstract; figures column 29, line 5 - line 47 ---	1,6,8
-/--		



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

20 December 1999

Date of mailing of the international search report

12/01/2000

Name and mailing address of the ISA

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Meyl, D

INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP 99/06340

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 985 921 A (SCHWARTZ HERMANN) 15 January 1991 (1991-01-15) abstract; claims; figures column 1, line 46 -column 2, line 3 ---	1,6,8
A	EP 0 552 079 A (GEMPLUS CARD INT) 21 July 1993 (1993-07-21) -----	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/EP 99/06340

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9534054 A	14-12-1995	DE 4419805 A	07-12-1995
		AT 185010 T	15-10-1999
		AU 701313 B	28-01-1999
		AU 2787295 A	04-01-1996
		CA 2168891 A	14-12-1995
		CN 1131991 A	25-09-1996
		DE 19580597 D	01-04-1999
		DE 59506884 D	28-10-1999
		EP 0712520 A	22-05-1996
		JP 9501529 T	10-02-1997
		US 5850524 A	15-12-1998
EP 0790706 A	20-08-1997	US 5737766 A	07-04-1998
		JP 9232433 A	05-09-1997
US 5533123 A	02-07-1996	EP 0715733 A	12-06-1996
		WO 9600953 A	11-01-1996
US 4985921 A	15-01-1991	AT 123347 T	15-06-1995
		DE 58909263 D	06-07-1995
		EP 0337185 A	18-10-1989
		ES 2072870 T	01-08-1995
EP 0552079 A	21-07-1993	FR 2686170 A	16-07-1993
		JP 5314013 A	26-11-1993
		SG 52681 A	28-09-1998
		US 5875480 A	23-02-1999

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference WO2924-DV/jdh		FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP99/06340	International filing date (day/month/year) 30/08/1999	Priority date (day/month/year) 01/09/1998	
International Patent Classification (IPC) or national classification and IPC G07F7/10			
Applicant MINDPORT B.V. et al.			

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 5 sheets, including this cover sheet.

- ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 7 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 21/02/2000	Date of completion of this report 28.12.00
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Stratford, C Telephone No. +49 89 2399 2268 

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP99/06340

I. Basis of the report

1. This report has been drawn on the basis of *(substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments (Rules 70.16 and 70.17).):*

Description, pages:

2-4	as originally filed	
1,5-7	with telefax of	11/12/2000

Claims, No.:

1-10	with telefax of	11/12/2000
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Drawings, sheets:

1/2	as originally filed	
2/2	with telefax of	11/12/2000

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP99/06340

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims 1-10
	No:	Claims
Inventive step (IS)	Yes:	Claims
	No:	Claims 1-10
Industrial applicability (IA)	Yes:	Claims 1-10
	No:	Claims

2. Citations and explanations
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

5.0 With reference to Section V

5.1 Reference is made to the following documents:-

- D1: WO 95 34054 A (GIESECKE & DEVRIENT GMBH; LAMLA MICHAEL (DE); RANKL WOLFGANG (DE);) 14 December 1995 (1995-12-14)
- D2: EP-A-0 790 706 (HEWLETT PACKARD CO) 20 August 1997 (1997-08-20)
- D3: US-A-5 533 123 (NORCROSS THOMAS M ET AL) 2 July 1996 (1996-07-02)

This numbering will be adhered to throughout the application process.

5.2 Independent claims 1, 6, and 8 fail to meet the requirements of Article 33(3) PCT because they lack an inventive step.

The document D1 (in the description corresponding to Figure 9) is regarded as being the closest prior art to the subject-matter of claim 1, and discloses a secure device ('Datenträger') comprising a chip with logic circuitry, wherein the chip is provided with a unique chip layout (the hard coded serial number - see pages 17-18, bridging paragraph). The serial number in D1 is used to identify the secure device; it is clear to the skilled person that this could equally well be a class or group of devices.

The secure device of D1, which is preferably a chip card, is clearly intended for uses common to chip cards, i.e. including preventing unauthorised access. The skilled person would not require any inventiveness to implement the chip card in such a security system. Claims 6 and 8, which do not have any features not already stated in claim 1, are similarly not inventive.

5.3 The dependent claims 2-5, 7, 9, and 10 are also lacking in an inventive step. These claims relate to small changes and constructional details which the skilled person would choose to use according to the specific circumstances and requirements. The various uses of FPGAs are generally known in the state of the art, and their flexibility is clearly advantageous for such a use (see e.g. D2). Secure cells for physically protecting sensitive areas are similarly known (see e.g.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP99/06340

D3). Introducing the variation to the circuit at a design stage (e.g. at synthesis or layout) are obvious possibilities.

8.0 With reference to Section VIII

- 8.1 The term '...or the like' used in claim 1 is not clear, because the scope of the claim is not well defined (Article 6 PCT).